The JOURNAL *of* GEOGRAPHY

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VOLUME XLVI DECEMBER, 1947 NUMBER 9

AGRICULTURAL METHODS IN THE LOWER NILE VALLEY AND DELTA OF EGYPT

GEORGE P. STEVENS
Oklahoma Agricultural and Mechanical College

Egypt exhibits peculiar adjustments to environment in its agricultural methods of the Lower Nile and Delta Regions.

SEASONS AND CROPS

The agricultural year in Egypt is divided into three seasons: Summer (Sefi) from April 1 to August 1; the Flood (Nili) Season, August 1 to December 1; and Winter (Shetwi) from December 1 to April 1. The summer season contributes crops of corn, cotton, sugar cane and rice. Corn, millet and "flood rice" are cultivated in the flood season. The winter season provides crops of wheat, barley, beans, and clover. Winter, formerly the principal agricultural season, follows the rise of the Nile, but under perennial irrigation, crops can be grown all year around. Seasons often overlap. Crops are frequently sown before those of the former season have been harvested. In this way, about one-half of the Delta produces two crops a year. Some soils yield three crops annually, if planted to carefully selected crops.

METHODS OF IRRIGATION

Practically all of the cultivable land of the country depends upon the measure to which lands beyond the natural reach of the flood waters can be rendered productive by irrigation and upon the amount of fertilizing sediment brought down the Nile. Egypt employs two methods of irrigation: the "Flood" or Basin method and the Perennial method. The Basin method, the older of the two, has all but disappeared in the Delta and Middle Egypt, but is still important in Upper Egypt. The Perennial methods, tho introduced for

the first time on any considerable scale in 1861, now serves over eighty per cent of the agricultural land in Egypt.[5]

Basin Method: In tracts using this method of irrigation, rectangular dikes divide the land into "basins." Shallow canals carry the water, when the Nile is in flood, to these basins, which vary in size from six hundred to fifty thousand acres. The silt-laden water is admitted about the middle of August and allowed to stand for a period of nine or ten weeks, until the silt is deposited on the thoroly

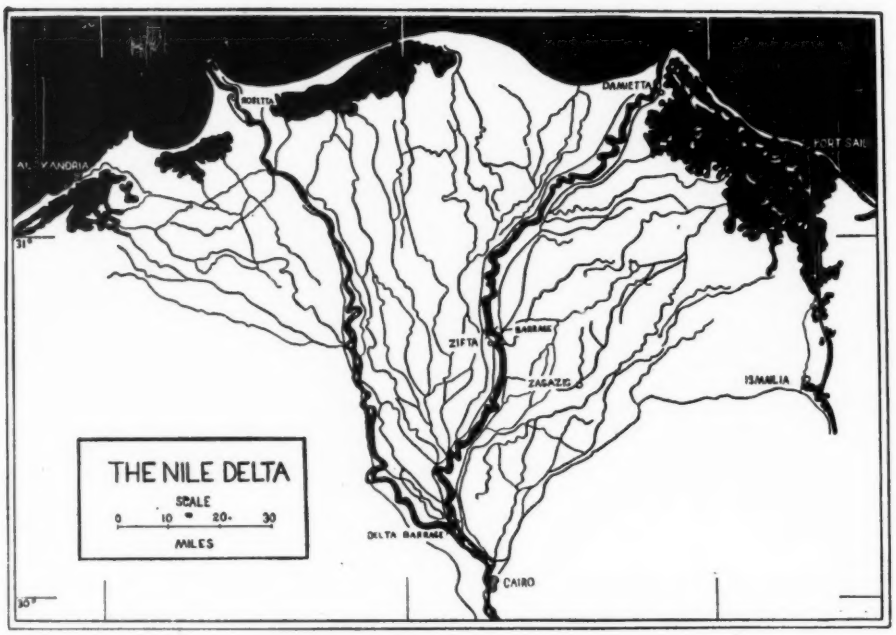

Fig. 1. Note the size of this region where over one thousand people per square mile make a living primarily from agriculture. (after Lyons)

moistened ground. Winter crops are then sown, and harvested the following April or May. The land lies fallow after the harvest, becoming dry and cracked until water can again be led to it. The summer heat wasted, a one-crop-a-year system prevails, except in so far as water can be lifted to the fields. This latter practice is only done on any appreciable scale on the foreign capitalized sugar cane plantations in Upper Egypt, which utilize powerful pumps.

The disadvantages, besides generally growing only one crop a year, are the difficulty of flooding the higher basins near the river with the primitive native lifting devices, and the lack of protection

against bursting dikes (during unusually high floods) in the lower basins.

Perennial Method: In Perennial irrigation the river is dammed back at convenient points to hold up the flood waters. High-banked canals carry the water to the cultivated areas, according to the needs of the crops, without the complete submergence of large areas necessitated by the Basin method. Multiple cropping and the full utilization of the summer heat is possible under this method.

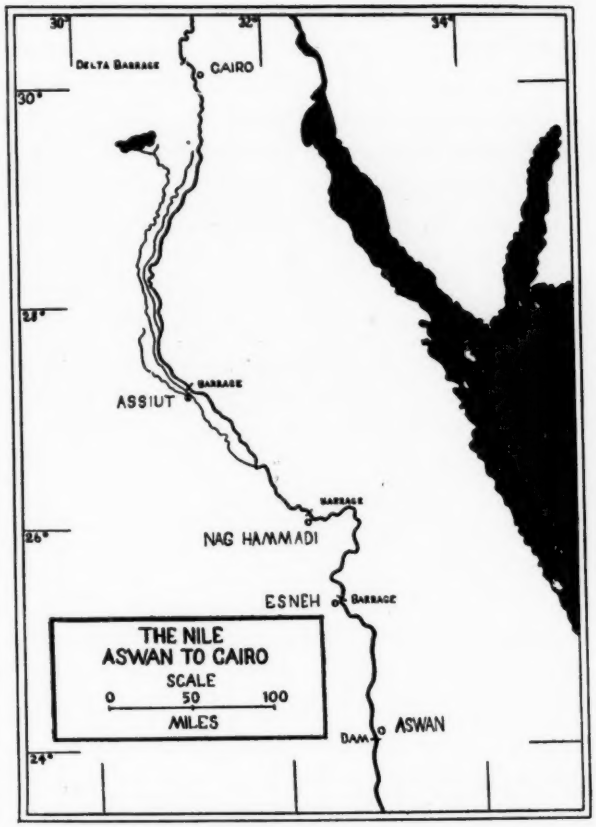

Fig. 2. This map shows the location of the barrages and Aswan Dam, the key to the irrigation system in Egypt. (after Lyons)

Perennial irrigation, however, has its share of disadvantages. They are, notably, the peasants' tendency to overwater, the lack of fertilizing silt held up by the dam, and the lack of the fallow period of the Basin method when the soil is cracked (naturally plowed) preserving fertility. The use of commercial fertilizer has increased along with the extension of this method of irrigation.

ASWAN DAM

Aswan Dam, located at the head of the first cataract where the river breaks thru a dyke of very resistant igneous rock, is the key to the control of the Nile's waters in Egypt. The original structure, completed in 1903, was enlarged in 1912, and again in 1933.

Two thousand yards long and with one hundred and eighty sluice gates, it holds 85,464,720,000 cubic feet of water each year in a lake some one hundred miles long.

The gates are closed at the end of November, when the silt-bearing portion of the flood has passed. The level of the water in the reservoir slowly rises reaching its maximum the following February. About April, when the normal irrigation supply down stream gets too low, the careful supplementation begins and continues until the first rise of the flood is felt. During this period strict regulations upon the use and sharing of the precious waters prevail. Restrictive measures are removed when the flood season arrives. At this time of year the delta lands can only use about one-eighth of the water that passes by Cairo, the remainder being lost to the sea.

The barrages are essentially great masonry barriers thrown across the river to raise the level of water behind them in order to fill the elaborate systems of canals in their respective portions of the valley or delta. These structures have limited storage value and should not be confused with the great dam and storage reservoir at Aswan.

Result of Irrigation Projects

Until these great irrigation projects were put into effect about forty-five years ago, the amount of land in Egypt available for farming had been practically stationary, being fixed by the annual overflow of the Nile. At an early date this land was brought into a high state of cultivation, labor being plentiful and cheap, and intensive farming practiced. The peasant of today lives much the same life as did the serf of the Pharoahs, for altho British capital and engineering skill have extended the area of farm land, and guaranteed the fellah (peasant) that sufficient water will flow in the canals, the moving of the water from the canal to his plot of ground behind the canal or river proper is done with few exceptions in the way that it was done thousands of years ago.

Water-lifting Devices

Shaduf: The bucket sweep (Shaduf) is the oldest of the simple mechanisms used by the fellah to transfer the water to his fields. It consists of a leather bucket or reed basket slung at one end of a pole which has a weight at the other and sways up and down on a vertical support, a contrivance by which the cultivator can scoop up the water considerably below his feet and raise it with compara-

tive ease to the mouth of a channel on a level with his breast. If the land is relatively high above the river, as is usual near the banks, several shadufs at different elevations may be employed. The fellah divides his land into little square plots—one or two yards—by ridges of earth five or six inches in height, and into these ridges forms an entrance for the water by depressing a little space with his foot. By adjusting the openings between each compartment the

Fig. 3. Egyptian Sakieh, a kind of water wheel or pump pulled by oxen, is used for raising water from wells or pits by means of buckets attached to an endless rope. By Ewing Galloway, N.Y.

cultivator can daily supply his plants with their water requirements. In the dry season a shaduf working continuously can supply water necessary to irrigate about two acres of land.

Sakieh: The Persian Wheel (sakieh), the second oldest of the water-lifting mechanisms, consists of a horizontal wheel (turned by one or two oxen) which sets in motion a vertical wheel around which are hung a number of earthen jars. The vertical wheel is sunk into a reservoir connected with the river. The revolved jars scoop up the water and bring it to a trough on a level with the top of the sakieh. Into this trough each jar empties itself and the water is conducted by an inclined channel into the adjoining cultivated ground.

Other Methods: Other simple, wooden, water wheels, the Archimedes Screw or "water snake"—smaller and operated by hand, and the Tabut—similar to the sakieh and operated by a camel or

ox, play their useful roles in the irrigation system. The negligible employment of modern pumps to perform this water-lifting task is due to the cheapness of labor as compared to the initial cost of the pumps, and their fuel cost in operation.

LAND OF UNIFORMITIES

Agricultural methods and crop production illustrate that Egypt is a land of uniformities.

Climate: Weather, the questionable factor in American agri-

Fig. 4. In the background may be seen a caravan of camels carrying rich mud from the Nile to preserve the fertility of the soil for growing crops of cotton and grain. By Ewing Galloway, N.Y.

culture, constitutes the known factor in Egypt. Except on the outer fringes of the delta, as at Alexandria, which receives an annual average of eight inches of rainfall, the area concerned remains dry. (Cairo averages one and one-half inches a year.) Seasonal temperatures are uniformly high enough for all tropical and most temperate crops, the growing season being the full twelve months.

A maximum of sunshine can be relied upon. The moisture control, thru the refinements of Perennial irrigation, is a mathematically known quantity.

Soils: Soils are, for the most part, uniform, and where they vary, affect the crop distribution rather than the agricultural methods employed. Yet, they deserve mention. Generally, they are alluvial silts, rich in nutrients and organic matter, being composed of about sixty to seventy per cent sand and sixteen to twenty-five per cent clay.[3] Soils with greater proportions of sand lie nearer the river than at a distance from it. The mud, composed of particles of minerals reduced to dust by mechanical agencies, but chemically unaltered, contains large proportions of colloidal clay which make it sticky and plastic when wet and shrink and crack upon drying.

The soils have no definite profile and under irrigation have a tendency to become saline. However, this accumulated alkali can usually be removed by flooding. Towards the lake area, on the outer fringes of the delta, its quality is injured by the salt, which impregnates the air. These poorer soils of the salt marshes are given over to rice cultivation.

The application of commercial fertilizer has expanded as a result of less fertilizing silt deposition with the advent and expansion of perennial irrigation. Nevertheless, the spreading of canal mud upon the fields is still most important in maintaining fertility. Dung functions as a fuel in Egypt rather than as manure.

COTTON

Cotton exceeds the combined values of all other crops, and around it centers most of Egypt's prosperity. Planted every summer on the better land it is followed in winter by wheat, barley, or vegetables. The raising of durra (maize or millet) generally utilizes the land not devoted to cotton. For Egypt, as a whole, maize leads in acreage, and beans and bread, made of durra and wheat flour combined, are the staple diet of the fellahin (peasants). Sometimes a crop of bersim (Alexandrine clover) is raised between the crops of cotton. The latter, very beneficial to the soil, increases the yield of cotton, while decreasing the bill for commercial fertilizer.

Preparation of the ground for the cotton crop includes plowing the land two or three times with a primitive plow, composed of a

pole, the end of which is often fitted with a metal plow share. The fellah keeps the end of the plow in the ground by placing his foot on a projective piece of wood at the end of the pole, connecting with the yoke. This plow is the same as pictured on the tombs of ancient Egypt. Smoothing the plowed field out with a drag follows, the drag often being weighted down with two or three men. Another plowing follows to turn up the ridges upon which the cotton is planted.

Planting is accomplished by making holes with sticks on both sides of ridges. Eight or ten seeds are dropped into each hole and covered by hand. Later the plants are thinned by hand. Sticks, plows, knives, and heavy hoes comprise the chief, and often only tools of the fellah. Hoeing and picking cotton are a family chore with all the members participating. Two acres "without a mule" is a fair average amount of land to a family of Egyptian cotton growers.[15]

GRAINS AND VEGETABLES

The growing of cereals utilizes similar primitive tools and again emphasizes hand labor. Broadcast sowing and sickle harvesting prevail. Maize seeds are placed in individual holes made by sticks in the previously prepared earth, and kernels of the harvested ears beaten off with heavy sticks.

A machine called a "norag" threshes the grain. It resembles a chair, which moves on small iron wheels or thin circular plates fixed to axle-trees, and is drawn in a circle by oxen around the stack of grain, which must be worked down into its path. The grain is winnowed out from the chaff and cut straight and thrown back into the center of the circle, the straw and chaff being gradually worked to the outside. Straw and chaff are then put into sacks and cared for almost as carefully as we care for the grain itself. Together, with corn stalks, the straw and chaff are used in building of the houses of the fellahin, as fuel, and, when green, as feed for cattle.

In addition to cotton and various grains, vegetable raising takes up an important part of the work-day of the fellahin. Of a very wide variety, beans, tomatoes, and onions are of particular note, for they make up important items of export. The last named are grown along the banks of the river proper in Upper Egypt.

A summer-grown rice (Sultana) is largely exported while the "flood" variety (sabaini) provides a favorite dish of the fellahin.

Fig. 5. Winnowing grain near Cairo. By Ewing Galloway, N.Y.

The growing of sugar cane is not typical of Egyptian methods, because of the utilization of modern machinery on the large foreign-owned plantations.

FAMILY

The fellaha proves a true helper to her husband. To him an extra wife serves as another laborer in house and field. She oftentimes helps in cutting clover, and in winnowing grain, first by the wind and then with a sieve. She beats out the maize kernels with heavy sticks, and together with the children helps hoe and pick cotton. The washing, drying, and grinding of the grain are her tasks. She must also care for the animals and make the butter and cheese. The fellah and his fellaha are "a slow, self-contained peasant folk."[17]

LAND TENURE

The land tenureship in Egypt throws some light upon the fellahin and their lot. Theoretically, three-fourths of the land in Egypt belongs to the Crown and is held in life leases. The state as

ultimate proprietor imposes a tax, the equivalent of rent. Of the one-sixth of the population that own some land, sixty-nine per cent of them have less than one feddan (1.038 acres) each.[3] Thus, for most of the agricultural workers who are renters, and the majority of owners, who possess less than one feddan of land each, hand labor and the use of simple locally-made tools is the rule.

Fig. 6. Harvest in the land of the Pharaohs. By Ewing Galloway, N.Y.

Cooperatives, first started in 1926, function principally as a go-between with the Agricultural Bank for seed and fertilizer loans, and have not been instrumental in introducing modern machinery into a region of small holdings and a population density of over one thousand people per square mile. The British influence in Egypt, altho affecting the general agricultural prosperity of the country in many ways, has not changed the methods as yet, with the exception of the use of commercial fertilizers. Practically all the fellahin raise their crops on credit and good delta land rents outright for about seventy-five to one hundred and fifty dollars an

acre. On a share-crop basis, where the landlord supplies everything but the labor, he takes four-fifths of the crop.[16]

CONCLUSION

The inherent fatalistic willingness of the fellahin to toil ceaselessly, by hand and with primitive tools in producing his crops, prolongs his impoverished lot in life. The cheapness of labor, by comparison with the cost of modern machinery, and the nature of the small land holdings, combine to retard the growth of modern mechanical agricultural methods. If changes in agricultural methods come at all, they will be very slow in the process. Perhaps, even, in "ageless" and overpopulated Egypt, such changes are not wanted.

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GEOGRAPHIC BACKGROUND OF HISTORY IN THE PACIFIC NORTHWEST

JESSIE L. DUBOC
Fromberg, Montana

The first chapter in the history of pioneers in any nation is that of the natives who preceded them. White men who came to the Northwest,* whether they settled there or not, borrowed heavily from the aboriginal inhabitants. This borrowing included Indian food, shelter, clothing, and various other necessities. Useful information about the resources and the nature of the country was another very important contribution from the natives. Indian guides led white men across the Rockies and fed them in waste places.

The famous Lewis and Clark Expedition of 1804-1806 might never have been successful, if these Captains had not received such aid from Indian scouts. Unfamiliar geographic conditions were frequently a menace to these explorers. On several occasions they almost caused the death of the party. At other times, these men had to adjust themselves to a radical change in diet or die of starvation.

MAN AND NATURE

Everywhere in the world, the culture of the inhabitants is affected by the flora, fauna, and other geographic factors, such as water supply, soil, climate, and topography. Ideas, ideals, customs, and even religious beliefs are modified by such forces. The character of these natural features, as well as their distribution and combination, vary from one region to another. These variations account for the fact that each geographic region developed its own distinctive culture. The Columbia Intermontane Region of the Pacific Northwest is no exception.

In primitive life, the relationships between man and his natural

* The term *Northwest* is popularly employed to include the four states of Montana, Idaho, Oregon, and Washington. Nature did not make this division, however.

In this article, the *Pacific Northwest* refers to the region that extends from the Rocky Mountains to the Pacific Ocean, in northwestern United States. The Pacific Northwest is divided into two distinct regions: (1) the *Coastal Region,* extending from the Cascade Mountains to the Pacific Ocean, and (2) the *Columbia Intermontane Region,* lying between the Rocky Mountains and the Cascades; it is mostly drained by the Columbia River and its tributaries.

Most of the State of Montana is not included in the Pacific Northwest. Two-thirds of this state lies in the Great Plains to the east of the Rocky Mountains. The Great Plains was the famous "buffalo land" of early days.

environment are direct and readily observed. For this reason, the illustrations for this discussion have been selected from the material culture of certain early inland tribes of the Pacific Northwest. In contrast, in a great urban center, these relationships are not easily recognized, for they are indirect and often remote.

INDIAN THEMES FOR ART AND DRAMA

Innumerable themes for song, story, and drama have been drawn from red man's activities on the Great Plains and the Coast, but few have been chosen from the Intermontane Region. The fancy of artist and writer has been caught by the spectacular war bonnet of the Crow chieftain, or the garb and implements of the Blackfoot. Raids, the hunt, the skin tipi and clothing of beautifully dressed skin of Montana Plains tribes have been favorite topics.

None of these articles existed in the Columbia Intermontane Region until after the culture in that area had been modified by contact with the Indians of the Great Plains. These cultural changes took place in relatively recent times. Certain phases of aboriginal life in the Intermontane Region might lend themselves to song and story, if they were more familiar. Nowhere on the North American Continent did natives exhibit more ingenuity in adapting themselves to the natural resources of their environment.

VEGETAL FOODS

In the Indian food economy one finds striking examples of the influence of the distribution and nature of the flora and fauna. The Coast, Columbia Intermontane Region, and Great Plains each had its own peculiar characteristics. One of the outstanding differences between these three regions was the relative distribution of meat, fish, and vegetables in the diet.

On the Great Plains, the buffalo reigned supreme and meat was the most important article of food. Not only was fishing not an industry, but many Plains Indians would not eat fish. Vegetables, when used, were secondary. At the other extreme, in the Coastal Region, the natives were largely fish-eaters.

The Lewis and Clark Expedition found that the Indians in the Intermontane Region were, in the main, vegetarians. These explorers had not long been west of the Rocky Mountains before several of the men, including the two Captains, became ill. The shifting from a meat to a vegetable diet had been rapid and extreme. The men had partaken too freely of the new vegetal foods.

The vegetables, however, must be credited with having saved the lives of the Expedition on several occasions, so the men reported. As they moved farther westward, again and again they purchased great quantities of them. Camas, bitter root, kouse, wappato, and other plants were highly prized by the Indians. The explorers sometimes paid a high price for them. They did not always know which plant they were buying, for bread or small cakes was often the form purchased.

The sunflower furnished seeds that were pounded into flour. The Paiute Indians of Idaho and Oregon ate the tiny seeds of sagebrush. The fruit and leaves of the prickly pear (cactus, *Opuntia*, spp.), with spines removed were relished. Cattail roots, high in protein, were dried and ground into meal; its succulent shoots were sought in the springtime. The syrup produced from the bruised roots of the cattail boiled in water was a substitute for sugar.

One of these "weeds" was responsible for a war. The camas was so important to the Bannock Indians that they relied upon an annual crop of its bulbs from Camas Prairie, in southern Idaho, as a major part of their supply. In a treaty with this tribe, the United State Government had guaranteed to these Indians the use of this Prairie for that purpose. Nevertheless, white men drove their hogs and cattle into this well-watered valley to fatten them. As time passed and nothing was done about this usurpation of their camas crop, the Bannocks rebelled. Historians recognize that this difficulty over camas was one of the major factors leading to the Bannock War of 1878.

Another evidence of the importance of vegetation in the diet of the tribes living west of the Rockies lies in the nicknames given to various groups by white men. The "Diggers" were a portion of the Shoshones, the tribe to which Sacajawea belonged. Other bands were "Seed-eaters," or "Root Diggers," or bore some other name of similar nature.

Limited Meat Supply

Most of the inhabitants of the Intermontane Region had no opportunity to make meat the chief article of diet. Theirs was a land of small game animals. Thousands of them had never seen a buffalo. There is some evidence that small herds of buffalo once roamed the plains in southern Idaho and entered the lower valleys in other parts of this region. By the time that white man reached this area, however, few buffalo were left, if any. Before the Intermontane

Indians obtained horses, they could not go to the Great Plains across the Rockies to hunt buffalo.

Rabbits, muskrats, ducks and other birds were important for food west of the Rockies. Even insects were eaten by the poorest bands. An occasional deer, elk, or bear added variety to the menu of the more fortunate tribes.

FIRST HORSES

Horses did not reach the Northwest until quite recent times. They were not native to America. The small prehistoric horse seems to have disappeared altogether. The first Indian ponies were descendants of the few animals brought to Mexico by the Spanish conquerors in the sixteenth century. The first horses to come to the Northwest and Great Plains arrived via the Southwest.

Pacific Northwest tribes probably did not obtain any considerable number of horses before the middle of the eighteenth century. One tribe is said to have been as late as 1840 in securing their first ones. Long before that date, Indian warriors of the Great Plains had become expert horsemen.

The chief cause for the slower development of horse culture in the Intermontane Region lay in the nature of the country. Much of this region is high and mountainous, or consists of rough plateau land. The extensive open spaces of the Great Plains, with level or rolling surface, was admirably adapted to speeding horsemen.

FISH IN INDIAN FOOD ECONOMY

Fishing was a leading industry along the Columbia River and its largest tributaries, where sturgeon and other large fish could be secured. Salmon were taken from many streams, especially at rapids and falls. Priest Rapids, Salmon Falls, and Kettle Falls were among the popular gathering places in the fishing season. Temporary fishing villages became increasingly numerous toward the western end of the region. Fish, fresh or dried, was the staple article on the lower Columbia and on the Coast.

The economic importance of fish is indicated in the variety of activities and devices that were concerned with fishing. In the gentler streams were innumerable dams and drag nets. Great numbers of weirs and traps held the fish so that they could be speared. At falls, taking salmon by dip nets was a common sight. The greatest of all of the centers was at The Dalles, on the Columbia River, in Oregon.

Great quantities of fish were smoked or dried for storage and for trading purposes. An enormous amount of fish changed hands at trading centers. Every family had its drying racks and fires for smoking. One end of each mat-covered long house was devoted to this industry. This was the up-river part of the house, since the prevailing winds blew up-river and carried the odors of the fish away from the sleeping quarters.

INDIAN COOK'S EQUIPMENT

Two essentials in the cook's outfit were the same on the Great Plains and the Intermontane Region. One was the digging-stick of a hardwood which the squaws used for obtaining bulbs and roots from the ground. The common ovens for roasting and steaming roots or meat were also similar: a deep pit heated by stones, and insulated by materials at hand, such as brush, twigs, dirt, and grass. This pit oven served as a successful fireless cooker.

On the other hand, the early utensils for preparing, storing, and transporting food differed radically in these two regions. On the Plains, rawhide bags were the common container, or the paunch of buffalo or other large animal served this purpose. Twine, rope, and tyings of various types were made from strips of rawhide. Cooking utensils, many dishes, and water vessels were of the same material.

Basketry was an important industry in the Intermontane Region. A great variety of cooking vessels, gathering baskets, and dishes were constructed from vegetal materials. Bark baskets held berries. Sieves, trays for winnowing seeds, beaters for gathering seeds, plates, and even spoons were woven or twined. The weaving was done with twine made from such invaluable materials as bark of sagebrush or of a tree, such as willow, or Indian hemp, or split cedar roots.

Water containers were unique. They were coiled or woven vessels. Some of them, shaped like bottles with small tops and stoppers, were made watertight by the use of pine pitch. On the outside, the pitch was smeared on with a stick. The first step in coating the inside was the dropping of pebbles into pitch. The coated pebbles were then put into the bottle, which was thoroly shaken until the desired result had been secured.

Food was sometimes stored in tightly closed bark baskets. These containers were often deposited in thickets of tall sagebrush. The cache might be a protected spot at the base of a cliff, which was concealed with sagebrush.

DRINK AND MEDICINE

Tea brewed from sagebrush was frequently used as a non-medicinal drink. Sometimes the leaves of this plant were chewed to allay thirst.

Sagebrush was only one of numerous plants used for medicinal purposes. The mashed leaves served as a poultice or liniment. Sage tea was taken as a general tonic, or for indigestion, or for colds, or for a fever, or was used as an eye-wash.

WATER TRANSPORTATION

Boats reached a higher development in the Intermontane Region than on the Great Plains. This was particularly true along the Columbia River, which was the great highway. They were better constructed than the dugout bullboats of the Missouri River. Lewis and Clark refer in their Journals to at least four different forms of Indian canoes observed on the Columbia River. They expressed great admiration for the Indian's unusual skill in constructing seaworthy boats and in navigating them.

In duck hunting on small lakes, as in southern Idaho, a crude balsa raft was the craft frequently used. Bundles of the long stalks of a water plant were tied together. The hunter kneeled in the middle of the raft and propelled it by means of a paddle. He had to watch for signs that the craft was leaking.

USES OF DOGS

In the pre-horse days, the only domestic animal, both east and west of the Rockies, was the dog. The use of the dog, however, was not the same in these two regions. A large portion of the Great Plains was well adapted to the dog travois. Dogs dragged many small bullboats, children, tipi covers, foodstuffs, bundles of firewood, and utensils. Children and articles were placed on the poles of the travois.

The Plains dog was the special property of the squaws, who trained him for this work. He was also of use as a watchdog. In a buffalo hunt, he was a nuisance and was kept at camp during the hunting. Dog travois helped in the blazing of trails. They supplemented the work of the larger and heavier horse travois in the deepening and hardening of these trails into well-marked roads.

For winter travel, the Great Plains Indians of southern Canada depended almost entirely on dog teams pulling heavy sledges. Passengers, as well as baggage, were thus transported. The dog

team is credited with having been invaluable in the opening up of the wilderness of that region.

The sledge dogs were driven into North Dakota and northeastern Montana by the early fur traders of the Hudson's Bay Company. The Mandans and other tribes soon learned to imitate this vehicle and employed it for winter transportation. Lewis and Clark followed their example in using sledges during their winter stay at Fort Mandan.

In the Intermontane Region, the dog sledge was probably unknown, as was the dog travois, until the latter was introduced by Plains Indians. Even the horse travois made no contribution to early Indian culture. The Columbia basin was not favorable to this form of transportation.

To some extent the pack dog was a beast of burden on northern portions of the Intermontane Region. This form of transportation may not have been aboriginal, but introduced after Indians obtained horses. The bags were similar to those used for a pack horse. Hide "moccasins" were sometimes placed on the feet of the dogs to protect them. On the Plains, warriors occasionally took dogs on their raids to carry extra pairs of moccasins, but bags were probably not used.

Several tribes of the Intermontane Region trained the dog for the hunt. This training was very different from modern types. The dog was often useful in hunting deer or smaller animals. In case he was to be employed for such a purpose, he was the property of the man, who alone was responsible for preparing him for this work. A hunting dog was not allowed to carry or drag burdens. Dog leashes were not uncommon.

Aboriginal Dwellings

The aboriginal dwellings of the Great Plains, Intermontane Region, and Coast differed radically. The famous skin tipi of the Plains was unknown west of the Rockies in pre-horse days. It maybe that even its shape was not an aboriginal type there. This tipi was introduced into the Intermontane Region after parties of adventuresome braves crossed the Rockies to the East to visit or to hunt buffalo on the Plains. These visitors were impressed by the convenient shape of the skin tipi and the ease with which it could be erected, or struck, or transported.

The first aboriginal winter dwelling in the Intermontane Region was subterranean. This was true at least in central and eastern Oregon and Washington, as well as in the corresponding area to

the north in Canada. These homes were sometimes entirely underground and had a roof flush with the ground. Others were constructed over a pit, but they extended partly above the surface.

These latter lodges, a semi-subterranean type, were entered either thru the smoke-hole in the roof or thru a side entrance. The smoke-hole seems to have been the common entrance among the more northerly tribes. The ladder for ascending and descending was either a notched log or a form similar to the modern ladder. A hand-rail was occasionally provided. The insulation of the roof consisted of any materials at hand: boughs, brush, dirt, grass, or driftwood. Nearly all of the Columbia River Salish Indians used this type of dwelling in the wintertime. It was considered warm and economical of firewood.

These semi-subterranean houses were quite different from the earth lodge of the Mandans and Hidatsa of western North Dakota. If the Plains tribes ever lived in underground homes, it is quite likely that their lodges were similar to those of tribes to the East of them. The Crow Indians may once have lived in dwellings like the huts of the Hidatsa, from whom they separated.

Another type of lodge which was unlike lodges on Plains or Coast was the long house thatched with vegetal mats. Lewis and Clark described one on the Columbia River which they called an Indian "apartment house." It was 226 feet in length and was divided into "apartments" by partitions that consisted of woven vegetal mats. When used as a dwelling, a long house was occupied by several families, sometimes as many as eighty or a hundred persons. Frequently, a long house was erected as a dance hall, or a council lodge, or a guest lodge.

Conical-shaped tipis were a common summer abode even before white man arrived on the scene. Most of them were covered with vegetal mats like those of the long house. Cattail and tule were among the waterproof materials of which these mats were woven or twined.

In localities where fleas were a pest, the temporary houses for the fishing season, as well as the buildings for drying or storing fish, were erected on stilts. On the lower Columbia, such buildings were so constructed as a protection from the tides.

Tyings of houses were of strong twine made from Indian hemp, or of tree bark, or of sagebrush bark, or of willow withes. Doors were usually in the form of woven mat that could be rolled up and fastened at the top.

Unique Clothing

One of the unique types of headgear worn was the woven or coiled basketry cap of the so-called Nez Perce type. Certain authorities believe that these caps originated among the Chinook Indians of the Coast, not the Nez Perce. Lewis and Clark were sufficiently intrigued by them so that they had their own heads measured and caps specially made to fit them. The Captains also bought extra caps for other members of the Expedition.

The poorer classes wore only plain ones of the shape of a skull cap. This protected the squaw's head from the tumpline in the transportation of burdens. In other tribes, both men and women wore decorative ones on gala occasions. These were conical in shape, sometimes double, like those bought by Lewis and Clark. Stripes were woven in colors, or beads or tassels were added. Cedar bark, Indian hemp, and willow bark were some of the basal materials for this headgear. Beargrass, dyed grasses, silkgrass, spruce roots, and tule furnished many of the decorative features.

At one time, sagebrush was the stock material for clothing among numerous tribes. The scanty, knee-length skirts hung in strings, which were twined at the waistline. The strings were made from the teased bark of such trees as the arbor vitae or from cattail or tule. Skirts and poncho-like shirts were made from willow. Footwear that was constructed from sagebrush included sandals, overshoes, and leggings.

Warrior's Wooden Armor

There was a time when wooden armor was common in several tribes. This cuirass was made by twining slats or rods. Warriors sometimes provided themselves with an additional protector: a breastplate of hide, similar to the one worn on the Plains. This garment was worn over or under the wooden armor, however, and did not takes its place. Many quivers were once made of sagebrush, at least by Canadian tribes.

Geographic Influences on Ideas

The distinctive characteristics of the Columbia Intermontane Region were not confined to the material culture of the aboriginal inhabitants. Innumerable illustrations might be drawn from other phases of the life of these inland tribes. Their social organization, the tendency toward pacifism, their unique burial customs, their

attitudes toward slavery and human rights—all of these bear testimony to the profound influences of geographical conditions of their land upon their cultural development.*

* The following book is the only college textbook devoted to the subject indicated in its title. Freeman and Martin (editors). *The Pacific Northwest.* A Regional, Human, and Economic Survey of Resources and Development. Authors 1942. Pp. xvi and 542. Published by Wiley and Sons.

The various authors of this book are authorities in their respective fields. Professor Otis W. Freeman is Chairman of the Department of Physical Sciences, Mathematics, and Geography in the Eastern Washington College of Education in Cheney, Washington. Professor Howard H. Martin is Head of the Department of Geography in the University of Washington in Seattle. The chapter that is devoted to the culture of the aboriginal inhabitants was contributed by Professor Erna Gunther, Head of the Anthropology Department in the University of Washington.

The best wall map of the Pacific Northwest is the physical-political map in color called *Pacific Northwest,* published by Denoyer-Geppert Company, 5235 Ravenswood Avenue, Chicago 40. This includes three small maps in color, showing the distribution of population, vegetation, and rainfall in the region. This map was edited by Professors Martin and Freeman. Two other maps in color, published by this same company, are helpful in a study of the geographical background of history in the Pacific Northwest. One is the *Historic Oregon Country* and the other is the *Historic Pacific Northwest.* In one map or the other are shown such items as missions, settlements, military roads and forts, trading posts, major Indian tribes, early overland exploration routes, towns and cities to about 1890. Both maps were edited by Carl H. Mapes, Teacher of Pacific Northwest History and Resources, Lincoln High School, Seattle.

AMERICAN THUNDERSTORMS

STEPHEN S. VISHER
Indiana University

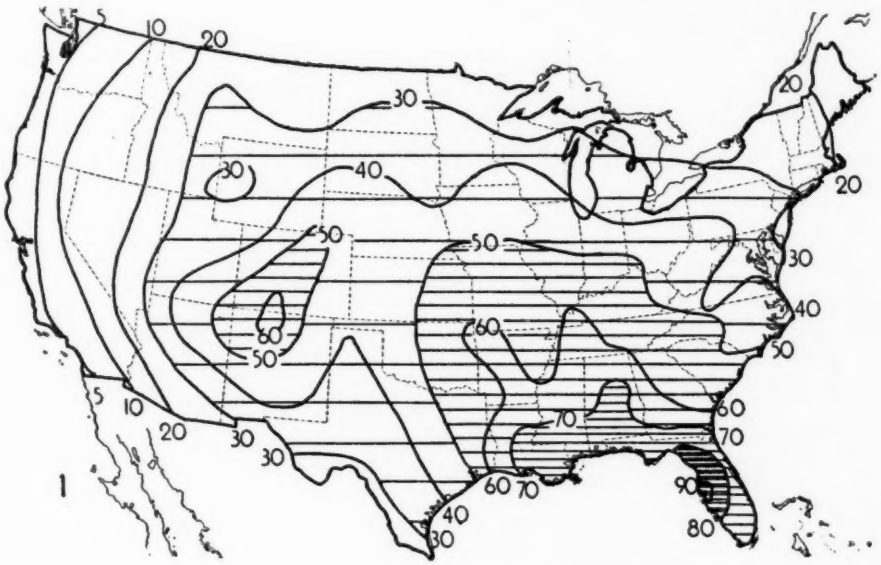
Thunderstorms are the world's most numerous storm; about 40,000 occur each normal day, chiefly in the tropics, according to the British authority C. E. P. Brooks. In the eastern half of the United States, a thunderstorm occurs in each locality a couple times per week during an average summer, and as most thunderstorms affect less than 1000 square miles, this means that during an average day more than a thousand occur in the United States alone. Thunderstorms are significant in various respects; they are the chief source of summer rainfall, they have imposingly beautiful cloud and lightning effects; they bring cooler temperatures and a refreshing change of weather. However they also cause considerable damage in several ways. The rain generally falls torrentially, and enough of it runs off slopes to cause much soil erosion. The lightning kills more than 500 persons per year in the United States and many thousands of cattle and horses, especially those standing near wire fences or under trees. The lightning also does much damage to trees, telephone, telegraph, and power lines and buildings. Many forest fires are started by lightning, and many millions of dollars of damage is done annually also to buildings. Most thunderstorms are accompanied by gusts of wind, some of which do considerable damage. Hail is a common associate of thunderstorms, and hail reduces, each average year, the harvest in the United States, according to federal estimate, by some 15 million bushels for wheat, a like sum for oats, and by some 24 million bushels for corn. Considerable damage is also done by hail to fruit, greenhouses and other glass, and to poultry. Tornadoes are also associated always with thunderstorms, and they do much damage a year in the United States, tho, fortunately very locally, and cause on the average more than 200 human deaths a year in the United States.

The harm that thunderstorms do is much more than offset by the good that they do. How valuable the rain they yield is depends, of course, when it comes. If, as often is the case, it comes when it is badly needed, an average thunderstorm may be worth millions of dollars to the farmers of its area.

With thunderstorms as important as they are, it is logical that they be studied intently so that their significance can be more widely

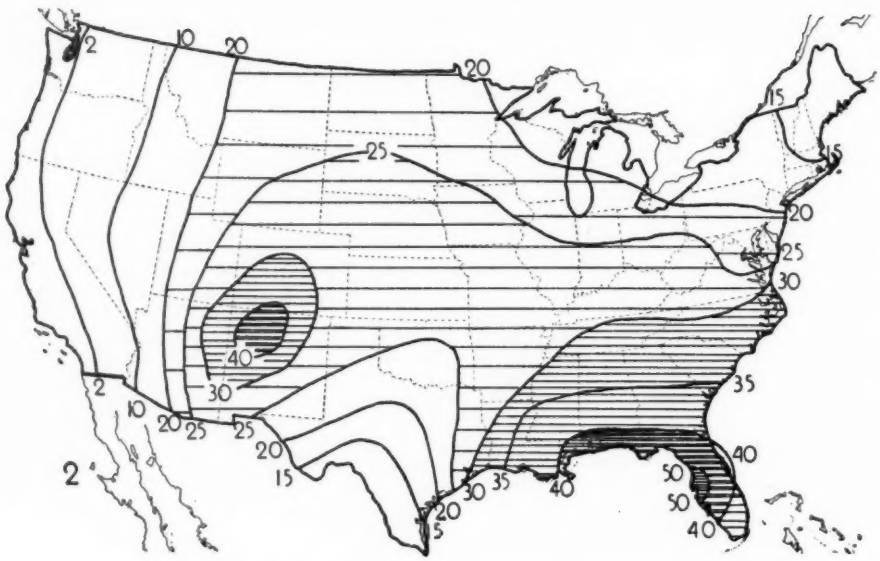
appreciated, and wiser adjustments to them can be made. Recently a two volume mimeographed highly technical report on thunderstorms in the United States has been issued by the Federal Government (Hydrometeorological Report No. 5 by A. L. Shands and others of the Weather Bureau, Army Engineers, and Soil Conservation service; 331 pp., plus 155 illustrations, 1947). Three of the four maps here given are adaptations of maps in that report and the other is based on three maps therein.

Map 1 shows the average number of days per year which have

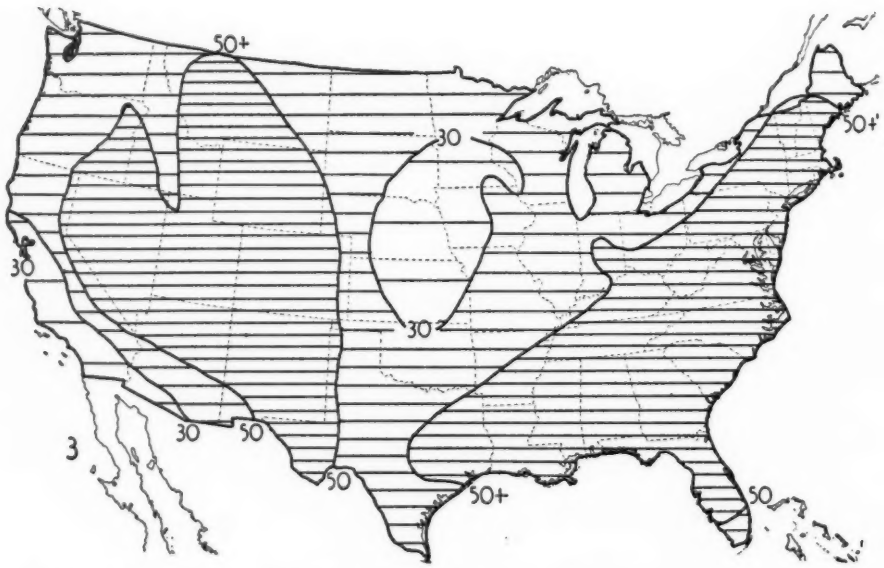


Map 1. Average Number of Days a Year Having Thunderstorms

local thunderstorms. It is based on the records for 40 years (1904-1943). It reveals a regional contrast from less than five thunderstorms per year on the Pacific Coast to more than 90 in part of Florida. East of the Rockies, there is a general northward decrease associated with the shorter warm season. The North has few or no thunderstorms during the colder months, while in the South they occur occasionally even in mid-winter. In the southern two-thirds of the country, Map 1 shows also a general eastward increase, associated with the eastward increase in average atmospheric humidity. West of the Rockies, there seldom is enough moisture available in summer to produce lowland thunderstorms.



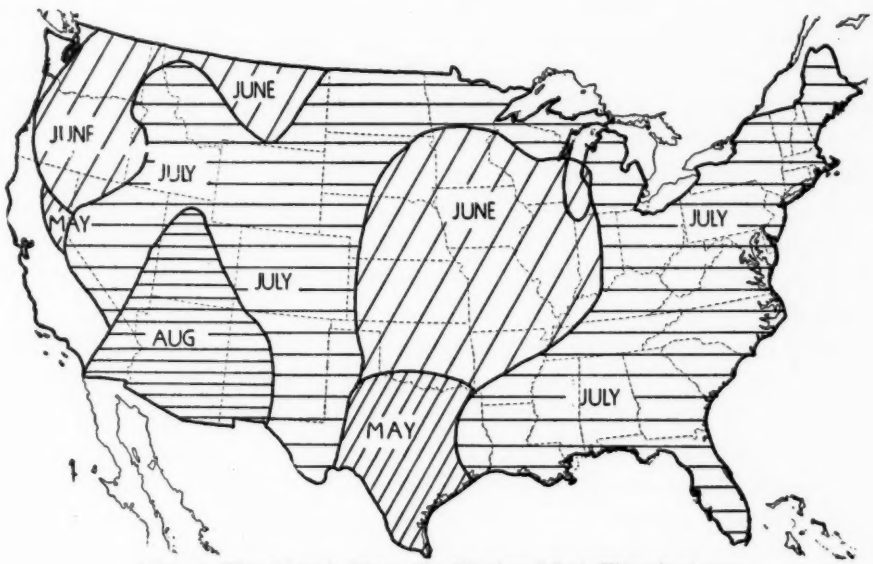
Map 2. Average Number of Summer Thunderstorms



Map 3. Percentage of the Summer Thunderstorms which Occur in the Afternoon

Map 2, of the number of summer thunderstorms, shows that a large share of the thunderstorms occur in summer; near the Canadian border east of the Rockies two-thirds or more; in the middle of the country about a half, and even near the Gulf of Mexico nearly a half.

Map 3 shows that in much of the country, more than half of the thunderstorm occur in the afternoon (from noon to 6 P.M., local time). Near the center of the country and in the Southwest, however, less than 30 per cent occur in the afternoon. Other maps (not published here) show that less than one-fifth of the thunderstorms occur in the 12 hours from midnight to noon except on the very coasts. (Over the oceans most thunderstorms occur between 3:00 and 6:00 A.M. local time, for then the vertical temperature contrast is greatest, since the air over the water cools more at night than does the water.)



Map 4. The Month Normally Having Most Thunderstorms

Map 4 shows the month during which most thunderstorms occur normally. July has most in the eastern third of the country and in most of the western half; June leads near the country's center and in the Northwest; August leads in the Southwest, but May leads in Texas.

HOW AND WHEN DOES "ACTIVITY" CONTRIBUTE TO SOCIAL EDUCATION?

MARY ALICE MITCHELL
Director of Elementary Education, Wilmington, Delaware

Educators frequently make the mistake of talking glibly about "experiences." We hear too often the phrase "learn by doing." Unless teachers will plan for and *select* experiences which will lead to social understanding, the objectives sought will not be attained. Teachers must recognize that the educational significance of the phrase "learn by doing" will be completely lost without careful planning. Specific activities must be planned and executed cooperatively by teacher and children for the purpose of achieving specific goals. We dare not take the chance of having our children learn only something because they've done any old thing. Activity in an educational sense must be dignified by recognizing the importance of sequence in learning, the importance of planning, and the importance of evaluation.

Let us consider some of the goals for the social education of eight year old children. The first and foremost goal is to learn the best way of living together. This does not mean merely learning the facts about the best way. It means that as a group, children live thru the process of achieving the best way. It means practice. Teachers are responsible for providing children with opportunities to practice democratic ways of behaving. Children need practice in behaving democratically so that they will know how to operate as responsible members of groups, whether these groups are in classrooms, schools, churches, playgrounds, or in the community. This means that children must have chances in school to think about, discuss and plan ways of solving everyday problems. Such problems might include the parking of bicycles, or the care of baseball equipment, when and where to throw snowballs, how to behave and choose food in cafeterias, or what to do about gangs, and the best way to distribute milk. The facts, the understandings, the attitudes, the social skills which should come to children as they deal with these problems form the most important part of the school's social studies.[1]

[1] This statement and the statements on Work, Housing, Conservation and Government are from *Social Studies: A Teacher's Guide*, Newton Public Schools, Newton, Massachusetts, November, 1946.

Let us consider another important goal. If our children are to become a truly literate citizenry then they must understand the changing relationship between man and his environment. Dr. Clyde Kohn in a recent article[2] says, "Elementary children should be given opportunity to think geographically about their own relationships to their environment and to other peoples and place, about the conservation of earth's resources and about the changes that are constantly taking place in the ways of living thruout the world." What kinds of experiences will help children to "think geographically"? What kinds of experiences can teachers and children plan for and select so as to insure the establishment of these understandings? The knowledge and information necessary to give children an understanding of the way people live demands that the children study and consider what is happening now and how it affects our living. Such topics as work, housing, conservation and government, must be developed with children into vivid learning experiences. Not until we do this can we be assured of children's greater knowledge and understanding of current world happenings. Films, transcriptions, use of radio in the classroom, news reports and the significance of selected articles in daily newspapers, in government and some commercial pamphlets are necessary tools in the development of an enriched program. There must be opportunity for children to participate in meaningful activities that will help answer their questions about what is happening now. Such activities will include among others: trips, observations, arranging educational exhibits, reading, writing, discussion, research, listening to the radio and radio transcriptions, and seeing films.

In Newton our eight year old children study their community. These third graders live thru the process of planning with their teacher, selecting and studying subject-matter that can readily be visited, and as a result of careful observation and recording, understood. This leads to the development of geographical thinking. During this process they learn about work. They learn that all of us depend on plants and animals for our food, clothing and most of our shelter; that some people make their living by raising plants and animals on the land; that some people make a living by buying and selling goods produced by other people. They ask these questions. "Where is the food grown that we eat?" "Where do we get our coal, oil, our electricity, our water?" They visit markets and

[2] Kohn, Clyde F. "Trends in Geographic Education," p. 3, *Cram's Classroom Classics*, 1947.

stores, see how the fire engines and the firemen work, how we keep warm in school and how policemen help us. They find the answers to questions about work in our community. This is important background experience, necessary if as they grow older we expect them to realize that work is often a key to understanding men's problems. They need this background in order later to learn about work and work conditions in other parts of the world for greater understanding of people. This is what is meant by sequence in learning.

Third grade children in mapping their community need to study and observe the kinds and numbers of houses and public buildings near their school. They learn about the materials used in building houses and at every opportunity watch their construction. They build houses and model villages with blocks. They find out about people's houses in our colonial times and the housing conditions in our cities today.

Another specific goal is to help children learn the principles of conservation so that our new generation will act to protect the future welfare of all people. Children can be guided to feel the social significance of conservation activities. They can learn about wild flowers and birds and how and why to protect them. They can be taught different ways of protecting and preserving the wildflowers of Massachusetts. They must be trained in the wise use of materials and the care of property.

In order to understand government, our form of government, children must have practice in deciding things together. When they think first about their problems, sometimes read about them and certainly talk about them together, they learn how to reach an acceptable settlement. Not until they have lived thru this process can they really understand our own government and how it works.

Children will use geographic understandings in their everyday life if their experience in school is planned sequentially to include thinking, talking, writing, planning, visiting, map-making, and evaluating. How can this be done? All of the activities just mentioned are in themselves skills or involve skill. Children come to school to learn these skills. But first they must understand what skill is. They must learn thru school experience to want skill to satisfy a need. Such experiences make children realize how limited they are without the intellectual power which comes from possessing and knowing how to use skill. Teachers know that there are times when they must provide direct instruction in certain skills, before children can find answers to social studies questions. For instance

they must learn that maps are tools for the development of geographic understanding. Children need to be taught that a map gives information about location, direction and distance.[3]

"Sounder methods of map instruction are needed if pupils are to develop the flexible knowledge of the relations of places which is necessary today. We must assume no knowledge of maps on the part of pupils who are beginning the study of geography. We must

present the concepts with careful gradation, and modify map instruction to harmonize at each level of advancement with the actual intellectual capacities and needs of children. Furthermore, specific goals of instruction need to be kept in mind." We have experimented in our third grades with four of the seven goals mentioned by these authors in their article, "Instructing Pupils in Map Reading," published in *Social Education*.[4] They are: "promoting readiness for understanding the globe and maps"; "developing the concept of what a map is" "giving meaning to common map symbols"; "leading children to use maps of all kinds."

Our third grade children made the maps accompanying this article. We believe they needed the experience of making the maps

[3] See, *Social Studies: A Teacher's Guide*, Newton, Massachusetts.

[4] Whipple, Gertrude, and James, Preston E., May 1947.

to help them achieve a geographic understanding of their community. Before children were ready to work on maps of the whole community they drew maps of their classrooms; of the school building; of their playground; of the route they walked from home to school. They learned how to establish the directions north, south, east and west on the playground and then how to sketch a plan on paper. They progressed in map-making by learning how to record the trips they made to many different places in various parts of the city. They learned, as they drew maps showing their homes in relation to the school, the people who lived north of the school; the streets which were north of the school; and the directional relationships of the different villages within the community and the position of these in relation to the City Hall. They learned that north is not always at the top of a map. Their maps were sometimes of streets; of places they'd visited; of the whole city; or pictures illustrating social, governmental and geographical ideas gained from their trips and discussions.

There is probably no better way to describe how these children developed the concept of what a map is, than to let them tell it in their own words. Here is their story:

HOW WE LEARNED TO TELL DIRECTIONS

First, we went on the playground at noon. Our shadows pointed toward north. When we faced north in the shadow direction, south was behind us, west was at our left hand, and east was at our right hand.

Then we learned how to read the weather vane and tell the direction of the wind.

Next, we learned how to use a compass. The compass points north. We found our other directions from that.

We can find directions at night if we know the North Star. We learned how to look for the dippers and then how to find the North Star.

We made maps of how we come to school. Then we told the directions that we took.

Next we made a map of Oak Hill and put all our streets on in the right places.

After that we studied the map of Newton and then all the big maps.

By Grade Three
Oak Hill School
Newton, Massachusetts

Another third grade made an airplane map of their impression of the Charles River. This was one of their first attempts and their directions were inaccurate but their impression honestly recorded. To correct inaccuracies of children's impression their next map experience was to project a map of the city of Newton for accuracy and re-orientation.

The statistical map or chart is another grade's first experience in graphic illustration. It shows symbolically the number of homes, schools, fire departments, libraries and churches in the entire city of Newton.

Still another group of children learned, as they made a different kind of map, about directions, relationships, and gained understanding of legends. This was done when they projected a map of the city by post office divisions and then drew in the main streets. This map activity became meaningful after their experiments with scale of miles and after they came back from visiting various parts of the city.

This paper has attempted to show how and when "experiences" can contribute to social education. And that teachers must be acutely aware of the specific goals that are to be the result of such experiences. The importance of purposeful planning then becomes self-evident. Teachers recognize that children's energy and interest can be harnessed to spur their learning when they too are acutely aware of the purpose behind an activity. When teacher and learners, as partners in activity, are well aware of purpose, then it becomes obvious that evaluation is necessary and natural. The experience or process of evaluating, itself becomes a most valuable lesson. Educational activity, or "experience" becomes not a hit or miss affair, but, thus dignified, is social education.

THE NATIONAL COUNCIL AT WORK

Geography is inherently a science of regional integration of subject matter of the various physical and social sciences and therefore can perform its greatest services when its program is functionally geared to the programs of other educational organizations or to governmental agencies.

A splendid example of this type of coordinated activity is the joint project of the forthcoming Yearbook on Geography to be published in 1948. Sponsored by the National Council for the Social Studies, the Yearbook is edited by Professor Clyde F. Kohn, Secretary of the National Council of Geography Teachers. The N.C.G.T. Committee on the Yearbook consists of the following members: Mrs. Katheryne T. Whittemore, Preston E. James, and Miss Zoe A. Thralls. Chapter assignments have been made by Professor Kohn to various geographers on the basis of special aptitudes and experience. A representative number of the chapter contributions are scheduled for preview on the Charlottesville program, namely, the papers of Section 1, of Section 2, and No. 1 of Section 3 of Saturday's program, and the papers of Section 2 of the program on Monday (Consult the November issue of the JOURNAL for the complete program). The National Council for the Social Studies is to be commended for promoting this project, establishing thereby a closer functional relationship between geography and the social studies program.

Another joint educational program is in the offing—between the National Education Association of the United States and the N.C.G.T. The N.E.A. is currently issuing a report on "Education for International Understanding." In connection with correspondence concerning this report Wilbur F. Murra of the N.E.A. suggests that some systematic follow-up publication involving cooperation between the N.E.A. Committee and the N.C.G.T. might be worked out. Such publication would interpret the main recommendations of the N.E.A. report "in terms of the interest and responsibility of geography teachers."

The United Nations Educational, Scientific, and Cultural Organization is recognized as offering one of the best opportunities for geographers to make their contribution to world peace. Since the National Council has a committee on Geographic Education for World Understanding our responsibilities in relation to UNESCO have been delegated to this committee. Sidman P. Poole, chairman of this committee, and Mrs. Erna Grassmuck Gilland, the secretary, have expressed great enthusiasm for the opportunity the UNESCO program presents to geography to serve the cause of peace.

At the first UNESCO conference, held at Philadelphia, Colonel Poole stressed the fact that "Geography is the subject par excellence to convey the desired understanding of this world as a basis for world peace."

Mrs. Gilland has reported at length on the UNESCO activities in the May, 1947 issue of the JOURNAL. Every Council member is urged to read it. Periodic correspondence from Mrs. Gilland reveals other multiple contacts with UNESCO, with the N.E.A. and other educational agencies.

The work of this committee on Geographic Education on World Understanding is considered of such importance that a special recommendation is being made to prepare a N.C.G.T. publication on this project.

Another project of the international relations type in which geographers and the Council as such will be interested in is that arising from the Fulbright Act (Public Law, No. 584) passed by the Seventy-ninth Congress. This act authorizes the Department of State to use certain foreign currencies and credits acquired thru the sale of surplus property for programs of educational interchange. Funds thus provided are available for study, research, and teaching in a foreign country. A study is being made of this Act with particular reference to its geographic implications. Correspondence at this time (early November) reveals that the implementation of the Act is still in the formative stage. Later announcements will follow.

ALFRED H. MEYER, *President*

EDITORIAL NOTES AND NEWS

The grim reaper has again taken one of America's great geographers—Ellsworth Huntington of Yale University. Probably very few eminent geographers of the world have stimulated thinking so much or exercised so great an influence as has Dr. Huntington. He was one who could gather details and convert those details into a whole that revealed his broad vision. Too many of us cannot "see the forest on account of trees." Born in Galesburg, Illinois, he went to southwestern Asia after graduation from Beloit College and returned in 1901 for several years further study of the region. Out of these studies came his historic volume "The Pulse of Asia." His special field was climate and its influence upon mankind. His studies appeared in more than twenty-five volumes, chapters in other books, and more than a hundred magazine articles. His writings are typified by such volumes as The Pulse of Asia, The Character of Races, Mainsprings of Civilization, Human Habitat, and West of the Pacific. The grim reaper left on his desk the unfinished manuscript of another volume—The Pace of History. Dr. Huntington has left a heritage of constructive work that will live and influence thinking for generations.

PROFESSOR BENOIT BROUILLETTE, of the University of Montreal, spent the past summer lecturing at several universities and before members of a number of geographic societies in France and Belgium. His extensive geographical work was recognized by the award of medals by the bronze medal of the Société Royale belge de Géographie, Bruxelles; the bronze medal of the Université de Liège, Liège, Belgium; the bronze medal of the Université Libre de Bruxelles; the silver medal of the Société de Géographie Commerciale de Bordeaux, France.

The Canadian Government recently established a Geographical Bureau in the Department of Mines and Resources.

The purposes of the Bureau are to collect, organize and make readily available geographical data on Canada and foreign countries for the use of all branches of the government. While geographical research has not been neglected by government agencies in Canada, no central organization for carrying it out has existed since the closing of the Geographic Office about twenty years ago.

The new Bureau is establishing a central depository of Canadian and foreign maps, and is arranging the exchange of official Canadian maps with government agencies in all parts of the world. A geographical library is being established and plans are being laid for the systematic study along scientific lines of the geography of those parts of the country which are still relatively unknown.

The Bureau now provides a centre thru which geographers and other scientists, both in Canada and elsewhere, may secure information formerly only available from many separate agencies. Geographers in the United States engaged in research on Canadian topics may find it advantageous to maintain liaison with the Bureau.

Dr. Trevor Lloyd, Chairman of the Department of Geography at Dartmouth College, has been granted leave of absence to organize the new Bureau, and has been in Ottawa since September assembling a staff. His address is: Chief, Geographical Bureau, Department of Mines and Resources, Ottawa, Canada.

The Ohio Council of Geography Teachers held their autumn meeting at Kent State University. Speakers and their topics on the program were as follows: Planning a Course in Tenth-grade Geography, by Mildred Merkle, Kent State Training School; Source Materials for Community Resource Studies, by Benjamin Moulton, Western Reserve University; Geography Materials Based on Current News, by Loretta Antel,

American Education Press. After luncheon, a field excursion was scheduled to an Ohio strip mine southwest of Dundee. Ann Berich, secretary of the Council, reported that Benjamin Moulton, Western Reserve University, was elected vice president to succeed Ralph Olson who has joined the staff of the University of Oklahoma.

The United States is rapidly getting a vast network of natural gas pipe lines. One of these lines which will soon be completed extends from West Texas to Blythe, California, where it joins a 30 inch line to Los Angeles. At full capacity this line will deliver 305 million cubic feet of natural gas a day. The energy derived from this amount of gas is roughly equivalent to that derived from 51,000 barrels of fuel oil or 12,000 tons of coal. The natural gas industry realizing that our known natural gas reserves are exhaustible, are searching for additional reserves. They are also looking to the conversion of low grade coal to gas at the mouth of the mine. Thus they hope to make the present network of lines a permanent asset in the transmission of energy.

According to a report by the United States Geological Survey, a natural flow of one million gallons of water an hour is being obtained from a well about a thousand feet deep in San Antonio, Texas. The water is used in cooling a Public Service steam power plant. The artesian wells in the country in which this well is located have had a discharge of water estimated at one hundred fifty five million gallons a day in 1946. There are also numerous springs in this area, some of which feed the San Antonio River. Altho the discharge of water from the springs and wells varies during droughts and seasons of heavy rainfall, it is believed that the reserve of underground water resources of the area is large. This is based on a recent study of the area and the ground water reservoir in the Edwards limestone.

The principle that frost is less likely to occur on a windy night than on a calm night has been utilized by orchardists and truck farmers who use airplanes to keep air currents moving over their threatened crops. Wind mills with broad sweeping arms have been also used. A new type of air mixer has large fans moving in opposite directions from the rotating top of a steel tower about thirty feet high. The fans resemble airplane propellers and are made of aluminum. A gasoline engine furnishes the power. The resulting air currents succeed in mixing the warm air above the trees with the lower colder air. One such tower has been reported to protect several acres of fruit trees. Tho the cost of the tower and its equipment may be a few thousand dollars, it is stated to be cheaper than the use of smudge pots where the chief cost may be labor. The use of air mixers in place of smudge pots will no doubt be popular with the public formerly plagued by clouds of soot drifting off the orchard protected by a smoke screen from burning crude oil.

Made-to-order weather—at least in limited areas—may not be as farfetched as it sounds. Suggested possibilities in weather control include attacks on clouds with dry ice and other substances to induce rain or snow in drought areas; the reduction of icing clouds, especially along airplane routes; and attempts to decrease the intensities of the forces contributing to the formation of hurricanes, thunderstorms, and hail. A report on this weather-control research was recently released on Project Cirrus, sponsored by the joint Army Signal Corps, office of Naval Research Air Force and General Electric Company. Regardless of the outcome of the search for a limited weather control, their findings are bound to lead to more accurate weather forecasts.

GEOGRAPHICAL PUBLICATIONS

Christopher Lloyd. **Pacific Horizons.** 188 pp., 7 map reproductions. George Allen and Unwin Ltd., London, 1946.

A concise and well written account of "the first heroic age of European enterprise in the Pacific." The voyages of the pioneer navigators of the Pacific are described beginning with Magellan in 1519 and ending with Cook's last voyage of 1776-1780. In addition to describing the routes followed and discoveries made the author skillfully draws character sketches of the leaders and points out their strengths and weaknesses. The Spainard, Mendaña discovered the Solomon Islands in 1568 but could not find the group again on a later voyage and nearly two centuries elapsed before the Islands were definitely rediscovered. During this time some map makers doubted the existence of the Solomons and removed them from the charts of the Pacific. The latitude of new discoveries was generally calculated fairly accurately but the longitude, without a chronometer, was all guesswork and until the time of Cook, islands were frequently incorrectly located. Quiros and Torres for Spain, and Tasman, Schouten and Roggeveen for the Netherlands made noteworthy voyages. Beginning with Drake, English privateers and buccaneers entered the Pacific in search of booty and new lands. Damoier wrote popular books about his voyages and is for that reason the best known of these men. It seemed reasonable in the 18th century that a great Terra Australis should exist in the south Pacific and many voyages were undertaken to find the elusive continent; Anson, Byron, grandfather of the poet, Wallis, and Cartaret for England, and Bongainville for France were among these. The greatest contributor to knowledge of the Pacific was Captain James Cook who in his three voyages between 1768-1780 disproved the existence of any continent in the Pacific south of Australia, discovered many islands and accurately mapped coastlines and correctly located scores of insular localities. Cook's death marked the end of the adventurous navigators. Following came the traders, settlers, whalers, missionaries, blackbirders and beachcombers with whom the book is not concerned.

OTIS W. FREEMAN

Eastern Washington College of Education

F. Webster McBryde. **Cultural and Historical Geography of Southwest Guatemala.** 240 pp., 24 maps, 300 photos. Smithsonian Institution, Institute of Social Anthropology, Publ. No. 4, Washington, 1947. **$2.75**

This is an account of various aspects of southwestern Guatemala, an area about 100 miles square, a short distance south of Mexico. Many details are given as to the crops grown, products sold at the markets, wearing apparel, house types and land use. Detailed diagrams, maps, sketches and photos serve as illustrations. Altho many historical and other facts of interest to specialists are presented, little attempt is made to present illuminating descriptions or thought-provoking summaries or deductions. A few facts culled from the report include the following. Altho Negroes were early introduced, they have almost disappeared. The several Indian languages are sufficiently different so that the different tribes cannot converse together, except in Spanish, the language of trade. A large share of the Indians now speak some Spanish and wear some European type of apparel. The diet is almost exclusively vegetarian, chiefly of maize and beans. This is despite the fact that sheep are widely raised on the uplands for their wool, and cattle are widespread. Cattle and hogs are bred chiefly in the highlands from which they are driven while young to the lowlands, where feed is more abundant, to be raised. Much of the area is sparsely settled, tho on the more favored areas the density is over 300 per square mile. Coffee is the main cash crop of the uplands, sugarcane and bananas of the coastal plain. The women do not wear hats largely because they often carry burdens on their heads. The cultivation, tho called "milpa," is careful and continuous,

not superficial and temporary as milpa usually implies. The various localities are by no means self-sufficient; indeed trade is highly essential despite the primitiveness of much of the culture.

Dr. McBryde carried on field studies in Guatemala repeatedly from 1927 to 1941. This volume presents his findings, incorporating his Ph.D. thesis. For the area it treats, it will long be significant.

Indiana University

STEPHEN S. VISHER

Guy I. Burch and Elmer Pendell. **Human Breeding and Survival.** 143 pp. Penguin Books, Inc. New York 16, N.Y. 1947. 35 cts. By mail 40 cts.

This inexpensive edition of the widely read "Population Roads to Peace or War" is a volume that most readers of the JOURNAL will be grateful for. The foreword and postscript by Walter Pitkin affords a good summary, but several other chapters are distinctly readable. In brief, the authors show that the human population tends to increase so rapidly as to make poverty and/or war almost inevitable unless the birthrate is sharply restricted. Migrations cannot solve the problem more than temporarily, nor can the more rapid use of natural resources, nor industrialization. Most geographers who have largely ignored the serious problems of the multiplication of peoples will, if they read much of the book, realize that they have ignored a vitally significant aspect of human geography. Conditions in India, China, Russia and western Europe are helpfully illuminated. Many data are given effectively, and there is frequent reference to the two American geographers most noted for their population studies, Ellsworth Huntington and O. E. Baker.

Indiana University

S. S. VISHER

Warren S. Thompson. **Population and Peace in the Pacific.** 397 pp. Illustrated. The University of Chicago Press. Chicago 37, Ill. 1946. $3.75.

The author points out the population growth in several areas constituting the Pacific realm of peoples, their food supply, mineral resources, modern industrial development, foreign trade, and economic future. Then he shows our stake in the Pacific. The differential population growth and differentials in resources become war promoters when nations become conscious of their inferiorities in resources and power. Some closely-knit international organization must recognize these dangers and provide for justice to nations to work out their own political status, and at some time provide for an equitable distribution of resources in accord with international law that production can be increased to provide a decent living.

Harlan H. Barrows, Edith Putnam Parker, and Clarence Woodrow Sorenson. **The American Continents.** 314 pp. Illustrated. Silver Burdett Company, New York. 1946. $2.00.

The second in a series of three elementary texts. What should fifth grade children known about the Americas to prepare them for intelligent and useful citizenship? The authors believe they should know something about past developments of natural resources in order to understand present ones and realize that our welfare depends on efficient uses of these resources geared in with the need of putting them on a sustainable yield basis. They also believe they should know that all peoples regardless of race and culture are interdependent. To bring out these concepts, a variety of simple maps and pictures are provided which are interpreted in the text. The part dealing with the United States occupies two-thirds of the volume.

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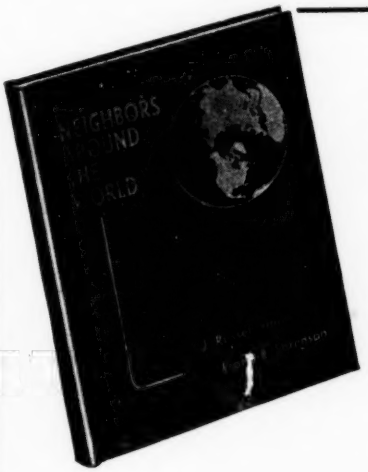

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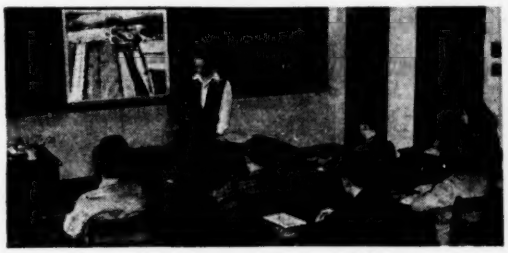

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The Arctic Institute of North America. Bulletin No. 1, March, 1946. 65 pp. The Arctic Institute of North America, 805 Sherbrooke St. W., Montreal, Canada.

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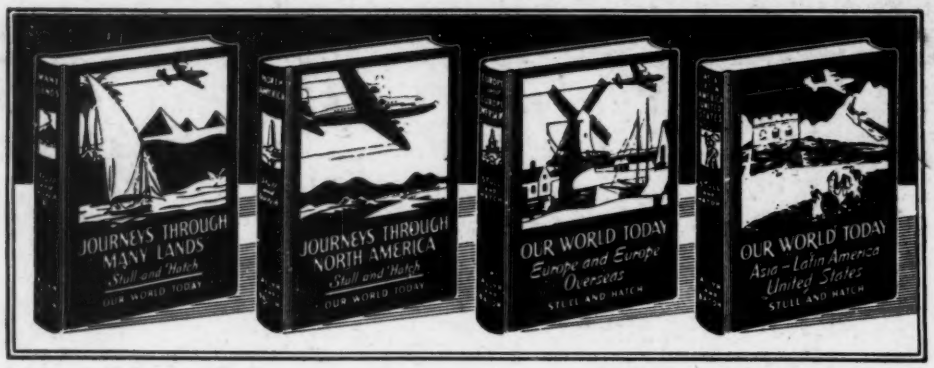

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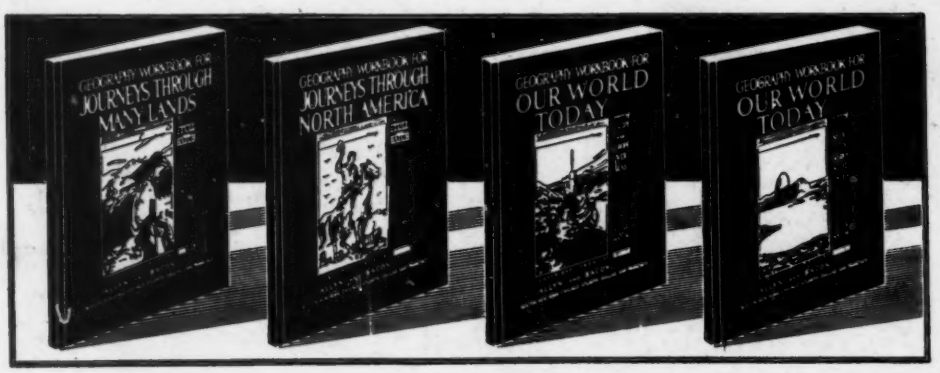
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